Packaging material with cavity, in particular for vegetable material

[0001] The present invention relates to packaging materials and more particularly to those intended for the protection of vegetable matter to be preserved.

[0002] Document US-A-4 528 228 discloses a cushioning pad comprising a layer of cushioning material, a gas-permeable envelope containing this layer, and a chemical composition dispersed in voids in the layer. That document therefore does not disclose two plies that define a cavity between them, nor does it disclose a substance capable of retaining gases housed in the cavity, nor does it disclose that one of the plies is a material permeable to gaseous ethylene but impermeable to water vapor.

[0003] Document US-A-5 334 623 discloses an absorbent substance. It does not disclose two plies defining between them a cavity in which a substance is found, Furthermore, the subject of that patent is a very particular composition containing tetrazine.

[0004] The subject of the invention is a packaging material that allows the vegetable matter packaged therein to be preserved for a longer time.

[0005] The packaging material comprises two plies defining between them a cavity. According to the invention:
a)a substance, capable of retaining gases in its environment, is housed in the cavity; and
b)at least one of the plies is made of a material permeable to gaseous ethylene and impermeable to water vapor.

[0006] By placing the substance capable of retaining gases in the cavity, it is prevented from coming directly into contact with packaged vegetable matter in such a way that the substance capable of retaining gases does not have to be of food grade. But most particularly what is created in the cavity is an atmosphere deplete in water vapor and also deplete in gaseous ethylene, which is the representative compound of the volatile gases given off by the respiration of the vegetable matter.

[0007] The active substance (i.e. the substance capable of retaining gases in its environment), which is preferably bonded to the substrate, allows close protection of the vegetable matter or other matter to be preserved. This is because ripening vegetable matter gives of f volatile compounds coming from the respiration of the matter. The discharge of such compounds, and the proximity of these elements of the ripening vegetable matter, causes autocatalysis of the complex mechanism governing the respiration of this matter. The respiratory intensity of the matter is in general characterized by the ratio of the amount of oxygen absorbed to the amount of carbon dioxide discharged, and consequently the amount of organic compounds diffusing from the surface of the ripening matter. The dynamics of this respiration are accelerated by certain of these volatile organic compounds in contact with the outer surface of this substance from which they emanate. This autocatalysis of the respiration and therefore of the ripening process, depends on the content of these compounds in the atmosphere directly in contact with the ripening vegetable matter. To limit this respiratory intensity, it is necessary to limit the volatile organic compounds responsible for certain autocatalysis. To do this, the active material placed in the immediate vicinity of the ripening vegetable matter will make it possible, depending

on its characteristics, to adsorb and absorb the essential volatile organic compounds causing the autocatalysis of the mechanisms governing the ripening
of all vegetable matter.

[0008] The substance is capable of retaining gases in its environment, especially capable of adsorbing gases, but preferably this active substance is not only capable of adsorbing gases but also of absorbing them. The active substance most particularly preferred is that disclosed in International Patent WO 00/64577. This is a porous material having the capability of adsorbing about 20 to 30% relative to its dry weight and comprising about 47 to 50% by weight of a silicon/carbon composite structure, about 12 to 20% by weight of carbon, about 5 to 7% by weight of a hydroxyl entity and about 1 to 2% by weight of oxygen. Preferably, this substance comprises, in a peripheral volume corresponding to substantially one-third of the total volume of the matter, about 75 to 85% of pores, the size of which is between 10 and 50 angstroms, and in the remaining central volume about 80 to 90% of cavities whose size is between about 200 angstroms and 2 μn. Its specific surface area may be between 1200 and 2200 m^2/g. It may include about 20% by weight of aluminium oxide and about 5% by weight of iodide. Its moisture content may be less than 2% with respect to its dry weight. Preferably, the active substance has a particle size of between 10 and 350 μm. A method for preparing the substance will be found in the aforementioned international application.

[0009] The ply made of a material permeable to ethylene and impermeable to water vapor is preferably made of hydrophobic cellulose. The water vapor permeability is preferably between 600 and 1000 g/m^2 per 24 hours at 38% relative humidity. Preferably, both plies are made of the

same material and, also preferably, the substance is bonded to one of the plies so that it is well distributed within the entire housing.

[0010] According to a preferred embodiment, the material of at least one of the plies has open pores with electrical polarity. This has the effect of promoting the gas aspiration chimney effect. Such polarization may have the effect of asepticizing the atmosphere within the cavity.

[0011] The subject of the invention is also a package, at least one of the walls of which is made of a material according to the invention, and also vegetable matter packaged in a package according to the invention.

[0012] The package may be formed by a cornet-shaped packaging paper, by a bridge or by a tray, at least one wall of which is made of a material according to the invention, the vegetable matter being preferably at a certain distance from the packaging material.

[0013] In the appended drawing, given solely by way of example:
-figure 1 is a sectional view of a packaging material according to the invention;
-figure 2 is a partial sectional perspective view of one embodiment of the packaging material according to the invention;
-figure 3 is a perspective view of a tray according to the invention;
-figure 4 is a perspective view of packaged flowers; and
-figure 5 shows a bag according to the invention containing lettuce.

[0014] The packaging material shown in figure 1 comprises two plies, 1, 2 made of hydrophobic cellulose, this being a material permeable to gaseous ethylene but impermeable to water vapor, as shown symbolically by the orifices 3. The two plies are joined together at their ends and thus define a cavity 4. Bonded to the outer ply 1 are particles S of the substance described in WO 00/64577. The inner ply 2 is made of a food-grade material. The pores of the plies 1 and 2 are polarized as shown symbolically by the - and + symbols in figure 1.

[0015] Figure 2 shows the material of figure 1, the cavities 4 being bounded, one with the respect to another, by lines S of heat-sealing or hot-melt bonding, both in the transverse direction and the longitudinal direction.

[0016] Figure 3 shows a tray having a body 7 made of a standard plastic and containing a vegetable matter M on the bottom. Lid S is made of a packaging material according to figure 2. The respiration of the vegetable matter N is weakened by the lack of oxygen, arid its volatile organic compounds produced, shown symbolically by the arrows F, are immediately converted by the active substance, while a small amount of CO_2 is added to that delivered by the respiration of the vegetable matter, this having the effect of even further stifling this vegetable respiration and of eliminating the autocatalysis generally caused by certain organic compounds, including ethylene. The water vapor produced by the respiration is limited and remains in vapor form on the walls, thereby creating an environment favorable to preservation. The asepticizing effect of the active substance favors preservation of the organoleptic qualities of the vegetable matter N. This packaging material makes it possible to lengthen the preservation time by 50 to 500%, depending on the vegetable matter.

[0017] Figure 4 shows the packaging of flowers. The flowers F are placed in the immediate vicinity of the packaging material according to the invention, in contact with the inner ply or close to it, whereas the more rigid stems T are wrapped in an active paper.

[0018] Figure 5 shows lettuce S contained in a bag. This bag comprises a body 9 and an opening which is sealed by a sealing device 10. The edges of the sealing device 10 are formed by packaging material according to the invention.